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PART III

General Services Administration

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Standard Safety Devices for Automotive Vehicles

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Proposed Revision of Federal Standard 515

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GENERAL SERVICES ADMINISTRATION

Federal Supply Service

[41 CFR Subpart 101–29.3]

FEDERAL STANDARD NO. 515—STANDARD SAFETY DEVICES FOR AUTOMOTIVE VEHICLES

Notice of Proposed Revision

Notice is hereby given that a revision is proposed in Federal Standard No. 515 which is prescribed in § 101–29.303 of the Federal Property Management Regulations. The revision as finally published will be issued pursuant to Public Law 88–515, approved August 30, 1964 (78 Stat. 696), and the Federal Property and Administrative Services Act of 1949 (63 Stat. 377), as amended, and will be effective 1 year and 90 days after the date of publication in the FEDERAL REGISTER. Federal Standard No. 515 was published originally in the FEDERAL REGISTER on June 30, 1965 (30 F.R. 8319).

The revision of Federal Standard No. 515 involves the addition of new detailed standards and changes in existing detailed standards and was developed through consultation with the automotive industry, technical societies, trade associations, the medical profession, and Government agencies. Proposed new detailed standards are designated as Federal Standards Nos. 515/18 through 515/26. Proposed changes in existing detailed standards are indicated by the letter "a" following the detailed standard number (e.g., 515/1a indicates the revision of 515/1). The changes in the existing detailed standards are as follows:

No. 515/1a—*Anchorages for Seat Belt Assemblies for Automotive Vehicles.* Made provisions for seat belt anchorages to the seats of school buses. Added anchorages for upper torso restraints for all outboard forward facing seating positions in vehicles other than buses.

No. 515/2a—*Forward Compartment Energy Absorption for Automotive Vehicles.* Title changed from "Padded Instrument Panel and Visors for Automotive Vehicles." Expanded impact area to include extremes of occupant size and to include 45-degree laterals to each side. Also added knee area protection and header and corner post padding.

No. 515/3a—*Recessed Instrument Panel Instruments and Control Devices for Automotive Vehicles.* Expanded impact areas to include extremes of occupant sizes and to include 45-degree laterals to each side. Added requirement that specified essential controls be in reach of upper torso belted operator.

No. 515/4a—*Energy Absorbing Steering Control System for Automotive Vehicles.* Changed title from "Impact Absorbing Steering Wheel and Column Displacement for Automotive Vehicles." This proposal more clearly permits collapsible steering columns, denies clothes-catching hardware on steering wheel and increases barrier collision test to 30 miles per hour.

No. 515/5a—*Safety Door Latches and Hinges for Automotive Vehicles.* Increased door latch load requirements and added a requirement for a positive locking device or handles not operable by accidental side, rearward or forward force.

No. 515/6a—*Anchorage of Seats for Automotive Vehicles.* Added a requirement for locking devices for folding and pedestal type seats.

No. 515/9a—*Hydraulic Service Brake Systems for Automotive Vehicles.* Title changed from "Dual Operation of Brake System for Automotive Vehicles." Brake performance requirements for sedans, carryalls, and station wagons added. Brake fluid system changed to exclude absorption of moisture. Provisions made to more clearly permit other than hydraulic actuation of emergency backup system.

No 515/12a—*Windshield Wipers and Washers for Automotive Vehicles.* Changed to include a specific area to be wiped.

No. 515/13a—*Glare Reduction Surfaces for Automotive Vehicles.* Expanded requirements to include all interior surfaces in the operator's field of view. Title changed from "Glare Reduction Surfaces—Instrument Panel and Windshield Wipers for Automotive Vehicles."

No. 515/14a—*Control of Air Pollution from Automotive Vehicles.* Title changed from "Exhaust Emission Control System for Automotive Vehicles." Incorporated requirements contained in a new standard proposed by Department of Health Education and Welfare.

No. 515/17a—*Rearview Mirror(s) for Automotive Vehicles.* Changed title from "Outside Rearview Mirror(s) for Automotive Vehicles." Added breakaway or detachable requirement for the inside rearview mirror and increased outside mirror minimum size to 5 inches.

Comments and suggestion are welcomed and should be submitted, in duplicate, to the Commissioner, Federal Supply Service, General Services Administration, Washington, D.C., 20405, within the period of 30 calendar days from the date of publication of this notice in the FEDERAL REGISTER.

The text of the changes in and additions to the Federal Standard No. 515 are set forth below.

Dated: March 4, 1966.

LAWSON B. KNOTT, Jr.,
Administrator of General Services.

Section 101–29.303 is amended as follows:

§ 101–29.303 Federal Standard No. 515—Standard Safety Devices for Automotive Vehicles.

(a) This section prescribes Federal Standard No. 515, covering safety devices for automotive vehicles, as required by Public Law 88–515, August 30, 1964 (78 Stat. 696). Automotive vehicles purchased by the Federal Government for use by the Federal Government shall be equipped with safety devices conforming to Federal Standard No. 515. Copies of this standard may be obtained from the Commissioner, Federal Supply Service, General Services Administration, Washington, D.C., 20405. Since Federal Standard No. 515 was originally prescribed (30 F.R. 8319, June 30, 1965), a number of detailed standards therein have been revised and new standards have been added. Where a standard has been revised the letter "a" appears in the number of the standard, e.g., 515/1a. The new detailed standards which have been added include Standards Nos. 515/18 through 515/26. In the introduction entitled Standard Safety Devices for Automotive Vehicles, paragraph S3 has been revised. As amended, Federal Standard No. 515 is composed of detailed standards which include:

(1) No. 515/1a—Anchorages for Seat Belt Assemblies for Automotive Vehicles.
(2) No. 515/2a—Forward Compartment Energy Absorption for Automotive Vehicles.
(3) No. 515/3a—Recessed Instrument Panel Instruments and Control Devices for Automotive Vehicles.
(4) No. 515/4a—Energy Absorbing Steering Control System for Automotive Vehicles.
(5) No. 515/5a—Safety Door Latches and Hinges for Automotive Vehicles.
(6) No. 515/6a—Anchorage of Seats for Automotive Vehicles.
(7) No. 515/7—Four Way Flasher for Automotive Vehicles.
(8) No. 515/8—Safety Glazing Materials for Automotive Vehicles.
(9) No. 515/9a—Hydraulic Service Brake Systems for Automotive Vehicles.
(10) No. 515/10—Standard Bumper Heights for Automotive Vehicles.
(11) No. 515/11—Standard Gear Quadrant (PRNDL) for Automotive Vehicles Equipped with Automatic Transmissions.
(12) No. 515/12a—Windshield Wipers and Washers for Automotive Vehicles.
(13) No. 515/13a—Glare Reduction Surfaces for Automotive Vehicles.
(14) No. 515/14a—Control of Air Pollution from Automotive Vehicles.
(15) No. 515/15—Tires and Safety Rims for Automotive Vehicles.
(16) No. 515/16—Backup Lights for Automotive Vehicles.
(17) No. 515/17a—Rearview Mirror(s) for Automotive Vehicles.
(18) No. 515/18—Window and Door Controls for Automotive Vehicles.
(19) No. 151/19—Ash Trays and Lighters for Automotive Vehicles.
(20) No. 515/20—Arm Rests for Automotive Vehicles.
(21) No. 515/21—Padding for Automotive Seat Backs.
(22) No. 515/22—Headrests for Automotive Vehicles.
(23) No. 515/23—Side Marker Devices for Automotive Vehicles.
(24) No. 515/24—Rear Window Defogger for Automotive Vehicles.
(25) No. 515/25—Roll Bars for Automotive Vehicles.
(26) No. 515/26—Fuel Tanks and Tank Filler Pipes for Automotive Vehicles.

(b) The Standard reads as follows:

[Federal Standard No. 515]

STANDARD SAFETY DEVICES FOR AUTOMOTIVE VEHICLES

* * * * *

S3. *Safety devices.* Safety devices shall be as specified in the detailed standards (see S4). Publications referenced in the detailed standards form a part of this standard, as applicable. The publications referred to are the issues in effect on the date of the publication of this standard in the FEDERAL REGISTER; in the case of changes in Federal Standard No. 515, reference to publications

therein are to the issues in effect on the date of the publication of the respective changes in the FEDERAL REGISTER.

NOTE: Copies of ASTM Standards may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa., 19103.

NOTE: Copies of SAE publications may be obtained from the Society of Automotive Engineers, Inc., 485 Lexington Avenue, New York, N.Y., 10017.

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[Federal Standard No. 515/1a]

ANCHORAGES FOR SEAT BELT ASSEMBLIES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes the requirements and test procedures for anchorages for seat belt assemblies for automotive vehicles. This standard does not cover seat belt assemblies.

S2. *Application.* This standard applies to sedans, station wagons, carryalls, buses (designated as school buses), and to light trucks up to 10,000 pounds G.V.W. Excluded are stand-up, walk-in package delivery vehicles with tilt type drivers' seats. Excluded are folding jump seats that are folded directly behind the front seat.

S3. *Standard characteristics.*

S3.1 *Definitions.*

S3.1.1 *Anchorage.* A seat belt anchorage shall consist of a threaded hole, an eyebolt, or other suitable means of attachment and shall be situated in a suitable structure to receive the seat belt attachment fittings.

S3.1.2 *Attachment fittings.* Attachment fittings are the parts necessary to attach the seat belt assembly to the vehicle structure.

S3.1.3 *Seat belt assembly.* A seat belt assembly is any strap, webbing, or similar device designed to secure a person in an automotive vehicle with the intention of mitigating the results of a traffic accident, including all buckles or other fasteners, and all hardware designed for installing the assembly in an automotive vehicle. The seat belt assemblies intended for installation in the anchorages specified hereinafter are described in Fed. Spec. JJ-B-185 and Standards for Seat Belts for Use in Motor Vehicles, 30 F.R. 8432 (July 1, 1965); 15 CFR.

S3.1.3.1 *Type 1 seat belt assembly.* A type 1 seat belt assembly is a lap belt for pelvic restraint.

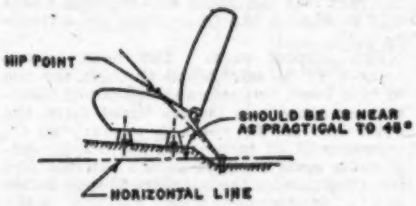
S3.1.3.2 *Type 2 seat belt assembly.* A type 2 seat belt assembly is a combination of pelvic and upper torso restraints.

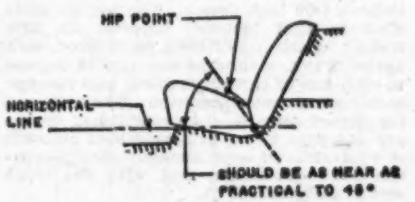
S3.1.3.3 *Type 2a seat belt assembly.* A type 2a seat belt assembly is a shoulder belt for upper torso restraint for use only in conjunction with a type 1 lap belt.

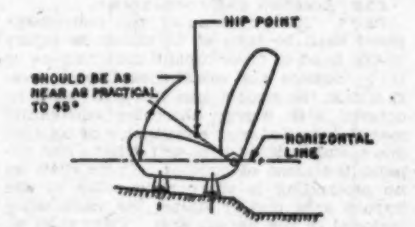
S3.2 *Anchorages.* The SAE Recommended Practice for Motor Vehicle Seat Belt Anchorage, J787, forms a basis, in part, for this Federal Standard.

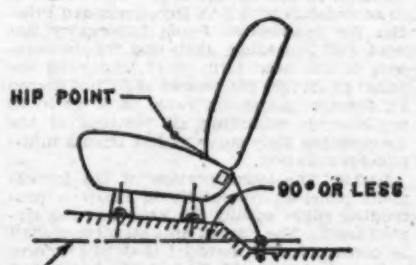
S3.2.1 *General.* When eyebolt anchorages are furnished, they shall conform to the applicable requirements of Fed. Spec. JJ-A-530. All threads shall be in accordance with the applicable requirements of the National Bureau of Standards Handbook H28. The location of the anchorages shall be determined with the seat in its rearmost limit of travel.

S3.2.1.1 *Anchorages for type 1 seat belt assemblies and lap portion of types 2 and 2a seat belt assemblies.* Anchorages for type 1 seat belt assemblies or the lap belt portion of types 2 and 2a seat belt assemblies shall be provided for three sets of seat belts for all bench type seats designed to accommodate three persons. The location of anchorages for type 1 seat belt assemblies or the lap portion of type 2 seat belt assemblies shall be such that a line from the anchorage to the passengers' "hip" point will make an angle from the horizontal as near as practicable to 45 degrees, as shown in figures 1, 2, and 3. The hip point is the point on the manikin defined as the "H" point in SAE Standard, Manikins for Use in Defining Vehicle Seating Accommodations, J826. The location of the hip point shall be determined by following the procedures in SAE J826. Anchorages for belts that will be installed over the seat bottom frame rear bar shall be rearward of a vertical line though the point where the belt will enter the seat, as shown in figure 4. All anchorages shall be spaced laterally so that the lap portion of the belt essentially forms a U-shaped loop when in use. The same anchorage shall not be used for both ends of a single type 1 seat belt assembly or the lap portion of a single type 2 seat belt assembly. Type 1 seat belt assemblies used in school buses shall utilize the seat for the anchorage attachment points and shall comply with the above, where applicable. Common anchorages may be used for one end of each of two assemblies provided strength requirements are in accordance with S3.2.2.









S3.2.1.2 *Anchorages for types 2 and 2a seat belt assemblies.* Except for buses and vinyl or canvas top or bolted-on metal enclosure vehicles and utility vehicles of the three-wheel type, automotive vehicles covered by this standard shall be provided with anchorages for a type 2 or 2a seat belt assembly for at least each outboard front seat occupant of carryalls and light trucks. Front and rear seat anchorages shall be provided for each outboard occupant of sedans and station wagons (forward facing seats only) for which the vehicle is designed. For buses, only the drivers' seat need be provided with anchorages for types 2 and 2a seat belt assemblies. At least three anchorages shall be provided for each type 2 or 2a seat belt assembly; two anchorages for the lap portion of a type 2 seat belt assembly and at least one anchorage for the upper torso or shoulder portion of a type 2 or 2a seat belt assembly. The upper end of the upper torso or shoulder portion of the type 2 or 2a seat belt assembly may be fastened to either the seat, side anchorage, rear anchorage, roof or floor provided that the seat or other structure over which the belt passes or to which it is fastened has been designed or reinforced to withstand the resulting load. The lower end may be fastened either to the lap portion of the belt or to the existing inboard anchorage for the lap portion of the seat belt assembly.

S3.2.1.3 *Anchorages for the upper torso or shoulder portion of seat belt assemblies.* Anchorages for the upper torso or shoulder portion of a type 2 or 2a seat belt assembly shall be provided for at least each outboard front seat occupant of carryalls and light trucks, and both front and rear outboard occupants of sedans and station wagons (front facing seats only) for which the vehicle is designed. With the seat in its rearmost limit of travel and the seat back in the nominal design position, these anchorages shall be longitudinally in line with or rearward of the torso line of the SAE 3-dimensional manikin described in the SAE Standard "Manikins for Use in Defining Vehicle Seating Accommodations," SAE J826. If there is a downward angle of the belt passing from the point of tangency on the shoulder of the SAE manikin to an anchorage or over suitable structure to an anchorage, this angle shall not be more than 40 degrees from the horizontal.

FIGURE 1.—Belt outside seat or through seat springs.

FIGURE 2.—Rear seat belt installation.

FIGURE 3.—Belt attached to seat frame.

FIGURE 4.—Belt over seat crossbar.

S3.2.2 *Strength.* The vehicle structure (excluding school buses) shall sustain the simultaneous pull on each set of seat belt assemblies for each passenger for which the seat is designed. Permanent deformation of any anchorage or surrounding area is acceptable provided there is no rupture or breakage and the anchorage does not pull loose. Each school bus seat may be tested independently, but must sustain established forces for all attached anchorages. The upper end anchorage for upper torso types 2 and 2a belts may be tested independently provided the anchorages are located in structural members in which no lap belt anchorages are located.

S3.2.2.1 *Anchorages for types 2 and 2a seat belt assemblies.* The outboard anchorage for the lap belt portion of a type 2 seat belt assembly shall sustain a pull of 2,500 pounds. Outboard anchorages for the upper torso or shoulder restraint portion of type 2 or 2a seat belts shall sustain a pull of 1,500 pounds for each anchorage. Common anchorages for the inboard ends of types 1 and 2a seat belt combination or the inboard anchorage of a type 2 seat belt assembly shall sustain a pull of 3,000 pounds. Common anchorages for one end of a center lap belt and either the inboard end of a type 1 seat belt or the lap belt portion of a type 2 seat belt and the inboard end of an upper torso or shoulder restraint shall sustain a pull of 5,500 pounds. A common anchorage for the inboard ends of two outboard lap belts and inboard ends of the upper torso or shoulder restraint portion

of the types 2 and 2a seat belt assemblies shall sustain a pull of 6,000 pounds.

S3.2.2.2 *Anchorages for type 1 seat belt assemblies.* Anchorages for type 1 seat belt assemblies shall sustain a pull of 2,500 pounds for each lap belt end attached.

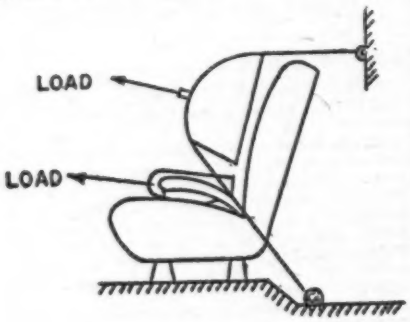
S3.2.2.2.1 *Anchorages for type 1 seat belt assemblies for school buses.* Anchorages for type 1 seat belt assemblies shall sustain a pull of 2,500 pounds for each lap belt end attached.

S3.2.2.3 *Anchorages for seat belt assemblies attached to the seat frame.* The seat structure, the seat adjusters, if applicable, and the attachments, shall sustain the load specified in S3.2.2.1, S3.2.2.2, and S3.2.2.2.1, as applicable, for each seat belt end attached to the seat plus the seat inertia force. The seat inertia force shall be 20 times the seat weight. Floor and seat deformation is acceptable provided there is no structural failure or release of the seat adjuster mechanism.

S3.2.3 *Test procedure.* The strength test shall be conducted either with the connection from the body block to the anchorages made in a manner in which the belts are installed or a suitable equivalent method. The load shall be applied to the body block at an angle of 10 degrees plus or minus 5 degrees from the horizontal. As applicable, the doors of the vehicle may be closed during the test.

S3.2.3.1 *Test for types 2 and 2a seat belt anchorages.* The loads specified in S3.2.2.1 shall be applied using either a body block set up similar to that shown in figure 5 or a suitable equivalent method. The strength test shall be conducted with the seat in place in the vehicle.

S3.2.3.2 *Test for type 1 seat belt anchorages.* The load specified in S3.2.2.2 or S3.2.2.2.1, as applicable, shall be applied using either a body block similar to that shown in figure 6 or a suitable equivalent method. The strength test shall be conducted either with the seat in place in the vehicle or with the seat installed on an applicable vehicle floor pan.



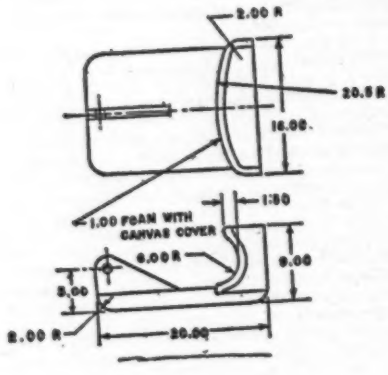


FIGURE 5.—Body block set up for combination shoulder and lap belt anchorages.

FIGURE 6.—Body block for lap belt anchorages.

[Federal Standard No. 515/2a]

FORWARD COMPARTMENT ENERGY ABSORPTION FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements and test procedures for forward compartment energy absorption for automotive vehicles. The forward compartment includes the areas of the instrument panel, sun visors, header, corner A pillars, and under the instrument panel with construction designed to afford a reasonable degree of protection for the front seat occupants wearing type 1 seat belt assemblies.

S2. *Application.* This standard applies to sedans, carryalls, station wagons, and to light trucks up to 10,000 pounds G.V.W.

S3. *Requirements.* Injury potential shall be minimized by constructing or locating forward compartment structures to eliminate impact or to reduce the forces generated by front seat occupants wearing type 1 seat belt assemblies when impacting these structures.

S3.1 *Impact areas.* The head impact areas shall be established through the use of type 1 seat belt assembly restrained manikins or other test devices based upon the equivalent to "H" point to top-of-head dimensions of 33 inches and 29 inches. Adjustable seats shall be in the extreme forward position for the indicated 33 inch device and in the extreme rearward position for the indicated 29 inch device. The impact areas shall be that included between the arcs formed by the top-of-head point when each device is swung forward and also 45 degrees to each side of the longitudinal axis through each normal seating position. The knee and leg impact areas shall be established by the use of a type 1 seat belt restrained manikin or equivalent of approximately 95th percentile male dimensions and with the front seat in midposition.

S3.2 *Location and construction.*

S3.2.1 The structure of the instrument panel shall be such as to minimize injury to the head of an occupant upon impact or to be outside the established impact area. If within the impact area the panel shall be covered with energy absorbing cushioning material applied over a crushable or collapsible metal backing that will deform and expand the areas of contact. There shall be no protruding or sharp rigid edges in the impact area and/or under the cushioning material in the impact area. Tests shall be in accordance with SAE Recommended Practice for Instrument Panel Laboratory Impact Test Procedure, J921, and the deceleration of the head form when impacting the panel at 22 feet per second shall not exceed an effective maximum value of 80 gs in 60 milliseconds excluding all portions of the deceleration time curve of less than 3 milliseconds duration.

S3.2.2 The lower portion of the instrument panel shall contain no sharp or protruding edges within the knee and leg impact areas. The impact area structures shall be constructed of material that will deform and expand areas of contact to absorb and minimize injury when struck by the knees or legs of front seat occupants.

S3.2.3 The sun visors shall be constructed of or be covered by energy absorbing cushioning material. The sun visor mounting shall be designed and located to provide a reasonable degree of head protection.

S3.2.4 The roof header impact areas shall contain no sharp or protruding edges. The impact areas shall be covered with 0.5 inch minimum of energy absorbing cushioning material to reduce the likelihood of injury to the occupant's head upon impact.

S3.2.5 The right and left front corner posts shall not contain any sharp or protruding edges. The corner posts in the impact areas shall be covered with 0.5 inch minimum of energy absorbing cushioning material to reduce the likelihood of injury to the occupant's head upon impact. Padding shall be designed and placed so as to minimize loss of visibility.

[Federal Standard No. 515/3a]

RECESSED INSTRUMENT PANEL INSTRUMENTS AND CONTROL DEVICES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes the location and identification of automotive vehicle instruments and control devices to afford a reasonable degree of protection for front seat occupants wearing type 1 seat belt assemblies in event of a collision.

S2. *Application.* This standard applies to sedans, carryalls, station wagons and light trucks up to 10,000 pounds G.V.W. Excluded are stand-up walk-in package delivery vehicles with tilt type drivers' seats. Also excluded are utility vehicles of the three-wheel type.

S3. *Requirements.* Injury potential shall be minimized by constructing, locating, or mounting control devices and instruments bezels in such a manner as to reasonably minimize contact by the heads of occupants wearing type 1 seat belt assemblies. Injury potential shall be minimized by the following means:

S3.1 *Location, construction, and mounting.*

S3.1.1 All instrument panel mounted control devices shall be located within reach of the driver wearing a type 2 or 2a seat belt assembly, except controls not essential to controlling a moving vehicle. The essential controls are the steering wheel, transmission selector lever, turn signals lever, ignition switch, headlight switch, and windshield wiper and washer controls. Essential controls shall be readily identified.

S3.1.2 The impact area shall be established through the use of type 1 seat belt assembly restrained manikins or other test devices having "H" point to top-of-head dimensions of 33 inches and 29 inches. Adjustable seats shall be in the extreme forward position for the indicated 33 inch device and in the extreme rearward position for the indicated 29 inch device. The impact area shall be that included between the arcs formed by the top-of-head point when each device is swung forward and also 45 degrees to each side of the longitudinal axis through each normal seating position.

S3.1.3 Control devices and instruments positioned outside the established contact area or which cannot be struck due to steering wheel, column, or shielding are not required to meet the specifications following. All other control devices shall have a contact area of not less than 1.0 square inch of flat surface with an edge radius of not less than 0.125 inch and shall be mounted and constructed of materials which will deflect flush within 0.375 inch of the panel surface or are to be mounted in such a manner as to allow them to be pushed flush with the panel surface or be detached by application of a force not to exceed 90 pounds when struck from any position defined in 3.1.2.

S3.1.4 Instrument bezels not meeting S3.1.3 and likely to be contacted by the head of a belted occupant shall have an edge radius of not less than 0.125 inch and shall

project not more than 0.250 inch above the surface of the panel or shall be so shielded as to reasonably minimize contact by the head of belted occupant.

S3.1.5 The transmission selector lever knob end shall have a relative flat area of at least 1.0 square inch when selector lever is mounted on the steering column within the impact area as defined in S3.1.2. There shall be no permissible complete penetration of the knob by the selector shaft, under a head impact of 80 gs.

[Federal Standard No. 515/4a]

ENERGY ABSORBING STEERING CONTROL SYSTEM FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for energy absorbing steering control systems installed on automotive vehicles.

S2. *Application.* This standard applies to sedans and station wagons.

S3. *Standard characteristics.* The SAE Recommended Practice for Barrier Collision Tests, J850, forms the basis for section S3.4 of this standard.

S3.1 *Definition.* The steering control system is defined as the basic steering mechanism in combination with its associated horn actuating mechanism, trim hardware, etc., and includes any portion of the steering column assembly that may contain an energy absorber for the purpose of dissipating energy upon impact.

S3.2 The steering control assembly shall be constructed so that when it is impacted at a relative velocity of 22 feet per second with a torso shaped body block as shown in figure 1, weighing 75–80 pounds, and having a spring rate load of 600–800 pounds per inch, the force developed during collapse of the system shall not exceed 2,500 pounds. The spring rate is determined by loading the chest of the torso shaped body block with a 4-inch wide flat contact surface so that it is 90 degrees to the longitudinal axis of the body block, parallel to the backing plate and within 15 to 20 inches from the top of the head form. The load is measured when the flat contact surface has moved down ½ inch, and the spring rate is determined by doubling this load figure.

S3.2.1 When the steering wheel is the principal energy absorbing element, the load cell recording device shall be equivalent to the type shown in figure 2 and shall be mounted either directly behind the wheel or in the frontal surface of the body block, with its axis of primary sensitivity in the direction of body block travel at the time of impact. The steering wheel shall be mounted to the load cell by means of an appropriate nose piece at the same angle as it is to be installed in the vehicle.

S3.2.2 When a component or components other than the steering wheel, such as the steering column, is the principal energy absorbing element or contributes substantially to the absorption of energy, the load cell shall be located between the steering wheel and the remainder of the energy absorbing system, preferably immediately under the wheel, or in the forward, impacting surface of the body block.

S3.3 Other testing methods, such as high capacity acceleration facilities and anthropometric dummies, giving equivalent results, may be utilized in lieu of methods defined in S3.2, S3.2.1, and S3.2.2.

S3.4 The steering control assembly shall be so designed that when the front structure of the automotive vehicle collapses during the SAE J850 barrier collision test, or equivalent at 30 miles per hour, the upper end of the steering control system shall not be displaced rearward, relative to an undisturbed point to the rear of the steering wheel position, more than 5 inches.

S3.4.1 The rearward displacement of the steering control assembly shall be determined under dynamic conditions during the barrier collision or equivalent test.

S3.5 The steering control system shall be so constructed that there shall be no devices or attachments such as horn actuating mechanism, trim hardware etc., which can catch in the operator's clothing during normal driving maneuvers.

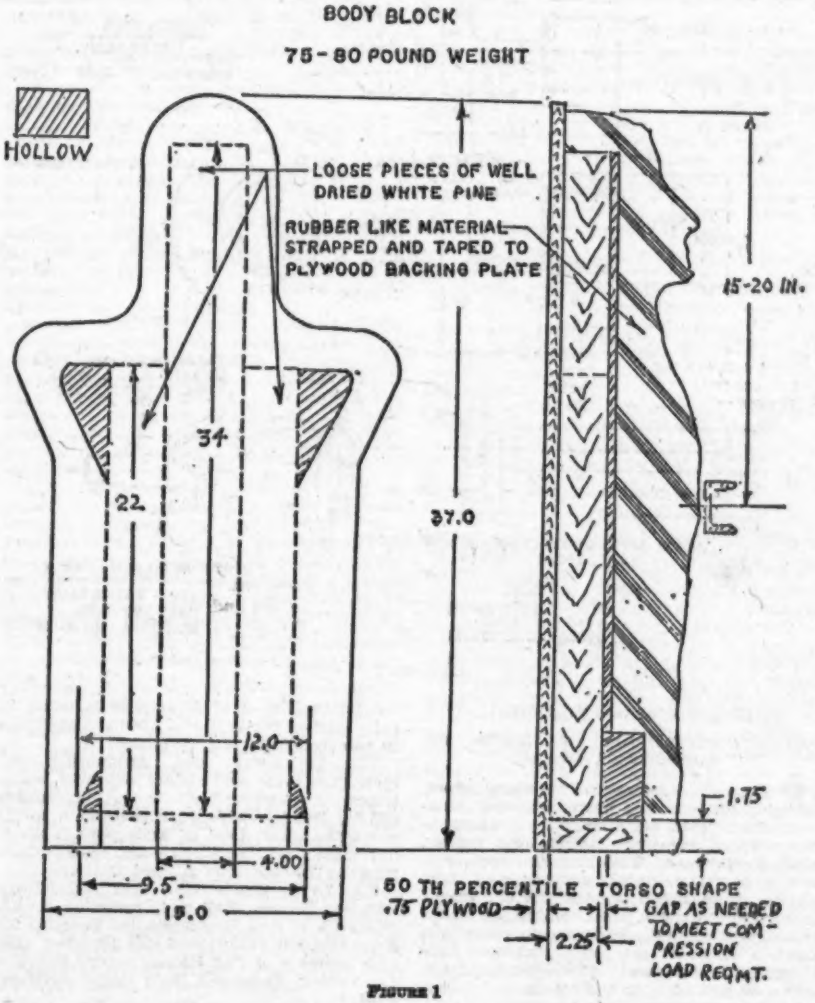


FIGURE 1

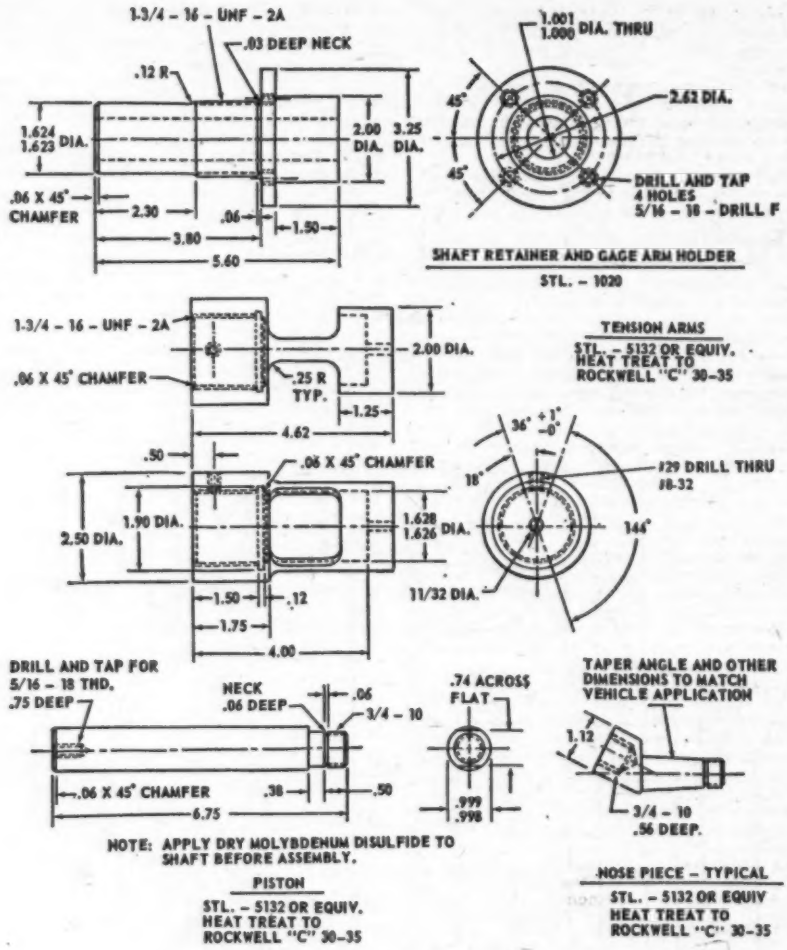


FIGURE 2

[Federal Standard No. 515/5a]

SAFETY DOOR LATCHES AND HINGES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes uniform test procedures and minimum static load requirements for automotive vehicle side door latches and hinges.

S2. *Application.* This standard applies to sedans, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W., except those light trucks with folding or cargo type doors or open body trucks with enclosures made of canvas, aluminum, fiber glass, plastic, and steel. The secondary latch load does not apply to sliding doors.

S3. *Requirements.* All applicable automotive vehicles shall be equipped with safety door latches and hinges. The hinges shall have ample strength to support the door and to withstand the longitudinal load and transverse load equal to or greater than that specified in S3.1 and S3.2 for the door latch and striker assembly. All door release handles on each door shall be provided with a single positive locking device not subject to accidental release. Interior or exterior handles need not be locked by this device if not operable by accidental side, rearward or forward force.

S3.1 *Longitudinal load.* Automotive vehicle door latch and striker assembly, when tested as prescribed under test procedures (S3.3), shall be able to withstand a minimum longitudinal load of 2,500 pounds when in fully latched position, and 1,000 pounds when in the secondary latch position.

S3.2 *Transverse load.* Automotive vehicle door latch and striker assembly, when tested as prescribed under test procedures (S3.3), must be able to withstand a minimum transverse load of 2,000 pounds when in the fully latched position and 1,000 pounds when in the secondary latched position.

S3.3 *Test procedures.* Test procedures and test fixtures shall be in accordance with section 4 of SAE Recommended Practice for Passenger Car Side Door Latch Systems, J839 and section 4 of SAE Recommended Practice for Vehicle Passenger Door Hinge Systems, J934.

[Federal Standard No. 515/6a]

ANCHORAGE OF SEATS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes strength requirements for anchorage and construction of automotive vehicle seat assemblies.

S2. *Application.* This standard applies to sedans, buses, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W.

S3. *Standard characteristics.* The SAE Recommended Practice for Passenger Car Front Seat and Front Seat Adjuster, J879, forms a basis for that part of this standard which applies to front seats.

S3.1 *Definitions.*

S3.1.1 *Automotive vehicle seat.* A structure provided to seat the driver and/or one or more passengers.

S3.1.2 *Seat frame.* The structural portion of a seat assembly.

S3.1.3 *Seat back frame upper crossbar.* The uppermost horizontal member of a seat back frame.

S3.1.4 *Seat adjuster.* A device suitably anchored to the vehicle structure which supports the seat frame assembly and provides for seat adjustments. This includes any track, link, or power actuating assemblies necessary to adjust the position of the seat.

S3.2 *Requirements, front seats.*

S3.2.1 *Seat adjusters and seat frame combinations.* Each combination of seat adjuster and seat frame, together with its attachments, shall be constructed and anchored to the vehicle structure which supports it in such a manner as to sustain a horizontal forward and rearward static load equal to a minimum of 20 times the weight of the fully trimmed seat.

S3.2.2 *Seat cushion and back frame combination.* Each seat cushion and back frame combination, together with its attachments, shall be constructed and anchored to the vehicle structure which supports it in such a manner as to sustain a rearward moment about the rear attachment of the seat frame to the seat adjuster of 4,250 inch-pounds for each passenger for which the seat back is designed. The load required to obtain this moment shall be applied to the seat back upper crossbar location normal to the seat back.

NOTE: Some energy absorption under impact can be obtained through deflection of the seat back. Therefore, some deflection and permanent set of the seat back consistent with rigidity requirements and normal occupant accommodations is permissible.

S3.2.3 *Folding seat back frames.* Each seat back frame designed to fold over the seat shall be equipped with a releasable, self-locking, restraining device or devices. The lock release shall be located so as to be readily accessible to the occupant of the seat and, if applicable, to permit egress to rear seat passengers.

The release shall be so designed and/or located as to minimize accidental release in collision situations. The restraining device or devices shall be constructed with sufficient strength to prevent the seat back frame assembly from folding forward under a horizontal static load equal to a minimum of 20 times the weight of the fully trimmed seat back frame, and with sufficient strength to sustain a moment about the attachment of the seat back frame to the seat frame of 4,250 inch-pounds in a rearward direction. The load required to attain this moment shall be applied at the seat back frame upper crossbar location normal to the seat with the seat back frame in a locked position. Excluded are tilt type drivers' seats installed in special purpose, stand-up, walk-in package delivery vehicles.

S3.2.4 *Pedestal seats.* Pedestal mounted drivers' seats designed to pivot forward, installed in special purpose, stand-up, walk-in type delivery vehicles shall be equipped with releasable, self-locking, pedestal restraining devices. The restraining device or devices shall be constructed with sufficient strength to prevent the seat assembly from tilting forward under a horizontal static load equal to a minimum of 20 times the weight of the fully trimmed seat components. The load shall be applied with the seat pedestal in a locked position and at the level of the center of gravity of the seat assembly.

S3.3 *Requirements, rear seats.*

S3.3.1 *Rear seat backs and seat cushions.* Each rear seat back and seat cushion designed to provide rear passenger seating in

sedans shall be constructed and anchored to the vehicle structure which supports it in such a manner as to sustain a horizontal forward static load equal to a minimum of 20 times the weight of the fully trimmed component.

S3.4 *Requirements, other seats.*

S3.41.1 *Seat frames.* Seat frames designed to be fastened to the vehicle floor without adjustment in sedans, buses, carryalls, and station wagons shall be constructed and anchored to the vehicle structure which supports them, either permanently or by detachable fittings, in such a manner as to sustain a forward and rearward static load equal to 20 times the weight of the fully trimmed seat.

S3.4.2 *Seat back frames.*

S3.4.2.1 Forward facing seat back frames designed to provide backs for intermediate seating in sedans and buses and intermediate and rear seating in carryalls and station wagons shall be constructed and anchored, either permanently or by detachable fittings as specified, to the seat frame in such a manner as to sustain a rearward (in relation to the seat) moment, about the rear attachments of the seat frame to the vehicle structure which supports it, equal to a minimum of 4,250 inch-pounds for each passenger for which the seat is designed. The load required to obtain this moment shall be applied to the seat back upper crossbar location normal to the seat back (see note in S3.2.2).

S3.4.2.2 Rearward facing seat back frames designed to provide backs for rear seating in station wagons shall be constructed and anchored, either permanently or by detachable fittings as specified, to the seat frame in such a manner as to sustain a rearward (in relation to the seat) load equal to a minimum of 4,250 inch-pounds for each passenger for which the seat is designed. The load required to obtain this moment shall be applied to the seat back upper crossbar location normal to the seat back (see note in S3.2.2).

S3.4.2.3. Longitudinally mounted seats in station wagons, and when specified for installation in trucks, shall be constructed and anchored, either permanently or by detachable fittings to the vehicle structure which supports them in such a manner as to sustain a forward and rearward (in relation to the vehicle) static load equal to 20 times the weight of the fully trimmed seat.

S3.4.3 *Folding seats.* Seats designed to pivot forward on their forward attachment to the vehicle structure shall be equipped with a releasable, self-locking, restraining device. The lock release shall be located so as to be readily accessible to the occupant of the seat or, if applicable, to permit egress to a passenger seated to the rear. The release shall be so designed and/or located as to minimize accidental release in collision situations. The restraining device shall be constructed with sufficient strength to prevent the seat assembly from folding forward under a horizontal static load equal to a minimum of 20 times the weight of the fully trimmed seat assembly.

S3.4.4 *Folding seat back frames.* Forward facing seat back frames designed to provide backs for intermediate seating in carryalls and station wagons and further designed to fold over the seat shall be equipped with releasable, self-locking, restraining devices. The lock release shall be located so as to be readily accessible to the occupant of the seat or, if applicable, to permit egress to a passenger seated to the rear. The release shall be so located and/or designed as to minimize accidental release in collision situations. The restraining device shall be constructed with sufficient strength to prevent the seat back frame assembly from folding forward under a horizontal static load equal to a minimum of 20 times the weight of the fully trimmed seat back frame, and with sufficient strength to sustain a rearward moment about the attachment of the seat back frame to the seat frame of 4,250 inch-pounds for each passenger for which the seat back is designed. The load required to attain this moment shall be applied to the seat back frame upper crossbar location normal to the seat with the seat back frame in a locked position.

S3.5 *Seats designed to provide seat belt anchorage.*

S3.5.1 *Sedans, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W.* Seat frames and seat back frames designed to provide anchorages for seat belts shall be constructed and anchored to the vehicle structure which supports them in such a manner as to sustain an additional forward static load equal to a minimum of 2,500 pounds for each lap belt end attached or 3,000 pounds for each combination lap and shoulder belt end attached.

S3.5.2 *Buses.*

S3.5.2.1 *Driver's seat.* Driver's seat frames and seat back frames designed to provide anchorages for seat belts shall be constructed and anchored to the vehicle structure which supports them in such a manner as to sustain an additional static forward load equal to a minimum of 2,500 pounds for each lap belt end attached, or 3,000 pounds for each combination lap and shoulder belt end attached.

S3.5.2.2 *Passenger seats.* Passenger seat frames and seat back frames designed to provide anchorages for seat belts shall be constructed and anchored to the vehicle structure which supports them in such a manner as to sustain an additional forward static load equal to a minimum of 2,500 pounds for each type 1 or 1a lap belt end attached.

S3.6 *Test procedure.* Testing of front seats shall be in accordance with the procedures set forth in SAE Recommended Practice J879. Testing of intermediate and rear seats shall be accomplished by applying similar procedures. Testing of seats designed to provide seat belt anchorage shall be in accordance with applicable procedures set forth in S3.2.3 of Fed. Std. No. 515/1a.

[Federal Standard No. 515/9a]

HYDRAULIC SERVICE BRAKE SYSTEMS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for hydraulic service brake systems installed on automotive vehicles.

S2. *Application.* This standard applies to sedans, buses, carryalls, station wagons, and to light trucks up to 10,000 pounds G.V.W.

S3. *Standard characteristics.* The National Committee on Uniform Traffic Laws and Ordinances, Uniform Vehicle Code; The Society of Automotive Engineers, Inc., Brake System Road Test Code—Passenger Car, SAE J843a and Service Brake System Performance Requirements—Passenger Car, SAE J937, form the bases for this standard.

S3.1 *Service brake system performance.* The performance ability of the fully operational service brake system for sedans and station wagons, shall be not less than described in section D of SAE J937, tested in accordance with the requirements of SAE J843a. The performance ability of the fully operational service brake system for carryalls, buses and light trucks up to 10,000 pounds G.V.W. shall be not less than described in section 12-302 of the Uniform Vehicle Code.

S3.1.1 *Design.* The service brake system shall be of such design that rupture or failure of an actuating-pressure component in the system shall not result in complete loss of function of the service brake system. Actuating-pressure components are defined as, the brake master cylinder or master control unit, wheel brake cylinder, brake line, brake hose or equivalent, as applicable. The hydraulic fluid system shall be sealed in such a manner so as to provide protection of the brake fluid from outside contamination.

S3.1.2 *Partial system performance.* In the event of rupture or failure to an actuating-pressure component to any single brake, the components of the unaffected portion of the system shall continue to function. Mechanical linkage or other means of brake application may be utilized to meet this requirement provided that continuation of the same motion on the same brake pedal used to actuate the normal system applies or actuates the braking force.

S3.2 *System effectiveness indication.* System effectiveness shall be indicated by means of an electrically operated red light mounted on the instrument panel. The light shall have an area of not less than 0.196 square inch. It shall illuminate before or upon application of the brakes when an actuating-pressure component of the system has sustained a loss of fluid or pressure. The indicator light system shall include a means for the vehicle operator to perform a test to assure the light bulb is operable.

[Federal Standard No. 515/12a]

WINDSHIELD WIPERS AND WASHERS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes minimum requirements for automotive vehicle windshield wiping and washing systems.

S2. *Application.* This standard applies to sedans, buses, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W., with windshields of one piece construction of the fixed type. Excluded are utility vehicles of the three-wheel type.

S3. *Requirements.* The windshield wiper system shall be driven by a motor actuated by a conveniently located control by which the operator of the vehicle may vary the frequency speed of wipers. The windshield wiper system shall be designed to provide two or more frequency speeds and each frequency speed shall be substantially constant regardless of engine load. Windshield wiper systems designed to interrupt at the end of each frequency cycle by means of a timing device will be acceptable if the timing device can be varied to provide continuous operation and two or more frequencies of interrupted operation. All requirements other than those specified herein shall be in accordance with SAE J903, Recommended Practice for Passenger Car Windshield Wiper Systems.

S3.1 *Wiped area.* The minimum wiped area of the windshield shall include the area of the windshield established by a horizontal dimension, projected as a line from the vertical center line of the eye level of the 95th percentile male with seat in midseat position and extending to within one and one-half inches of each corner post and including the center portion of the windshield. The minimum wiped area shall also include that portion of the windshield measured from the horizontal eye level line in a vertical direction 10 degrees above and 10 degrees below the horizontal eye level line at a point in front of the operator and a point in front of right seat occupant.

S3.2 *Windshield washers.* The windshield washer system shall be provided with a container with the capacity of at least 48 ounces of fluid. The container shall be made of such material that it will not crack or break in the event the fluid freezes. The fluid shall be applied to the outside of the windshield by vacuum pump or other method. The washer shall be actuated either manually or automatically.

S3.3 *Tests.* All tests shall be in accordance with SAE Recommended Practice J903.

[Federal Standard No. 515/13a]

GLARE REDUCTION SURFACES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes glare limits for appearance finishes of vehicle components in and adjacent to the operator's field of view to achieve the most practical reduction of distracting reflectance for automotive vehicles.

S2. *Application.* This standard applies to sedans, buses, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W.

S3. *Standard characteristics.* Standard methods, tentative methods, and tentative recommended practices and the American Society for Testing and Materials, ASTM D 307, D 523, D 791, D 1535, E 97, and the SAE Standard J826, form the basis for this Federal Standard.

S3.1 *Definitions.*

S3.1.1 *Field of view.* With the operator's seat in its rearmost position, the operator's field of view is defined as that area forward of a line extending to the sides of the vehicle from the point at which the back pan of the SAE J826 three-dimensional manikin makes contact with the operator's seat back.

S3.1.2 *Glare.* The visual effect of any dilutes or competes with the central attention signal on which attention is being focused.

S3.1.3 *Specular gloss.* The luminous fractional reflectance of a specimen at the specular direction.

S3.1.4 *Luminous directional reflectance (Munsell value).* Ratio of flux reflected to that from a perfect diffuse reflector similarly illuminated and viewed.

S3.1.5 *Saturation (Munsell chroma).* The attribute of color perception that expresses the degree of departure from gray of the same lightness. All grays have zero saturation.

S3.2 *Instrument panels.* The specular gloss of the surface of the material used for instrument panel top surfaces and appurtenances thereon which can produce glare in the windshield shall not exceed 30 units maximum, measured by the 85-degree method of ASTM D 523, or equivalent.

S3.3 *Luminous directional reflectance (Munsell value).* The luminous directional reflectance of the surface of the material used for instrument panel top surfaces shall not exceed 30 percent (which is equivalent to a Munsell value less than 6.0/–), when measured as described by ASTM D 307, D 791, D 1535, E 97, or equivalent.

S3.4 *Saturation (Munsell chroma).* The Munsell chroma of instrument panel top surfaces shall be no more than /6.

S3.5 *Windshield wiper arms and blades.* The specular gloss of the surface of the material used for windshield wiper arms and wiper blades in the operator's field of view shall not exceed 40 units maximum, measured by the 20-degree method of ASTM D 523, or equivalent.

S3.6 The specular gloss of the surface of the material used for instrument bezels, windshield molding, control devices, horn ring, rearview mirror mounting hardware, trim hardware, etc., in the operator's field of view shall not exceed 40 units maximum, measured by the 20-degree method of ASTM D 523, or equivalant.

S3.7 Instruments, control devices, etc., shall be so located so as to present a minimal reflection into the windshield in the operator's field of view under daylight and night driving conditions.

[Federal Standard No. 515/14a]

CONTROL OF AIR POLLUTION FROM AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for the control of emissions from new motor vehicles and new motor vehicle engines which are likely to cause or contribute to air pollution.

S2. This standard applies to sedans, carryalls, station wagons, and light trucks up to and including ½-ton pickup or equivalent equipped with engines of 50 cubic inch displacement or over.

S3. *Standard characteristics.* The proposed regulations of the Department of Health, Education, and Welfare, Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines, published in the FEDERAL REGISTER on December 31, 1965 (30 F.R. 17192), form the basis for this standard.

S3.1 All automotive vehicles and engines covered by this standard shall be equipped with integral or ancillary control systems to provide control of emissions in accordance with the requirements set forth in the regulations cited in S3.

[Federal Standard No. 515/17a]

REARVIEW MIRROR(S) FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for rearview mirror(s) for automotive vehicles to provide reasonably unobstructed driver vision to the rear.

S2. *Application.* This standard applies to sedans, buses, carryalls, station wagons, and to light trucks up to 10,000 pounds G.V.W. Vehicles with bodies designed without rear windows and vehicles that require more than one outside mirror and truck-type vehicles with small rear windows are excepted from the requirement for an inside rearview mirror.

S3. *Requirements.* The rearview mirrors shall provide the driver with a clear, undistorted view of unit magnification under day and night operating conditions.

S3.1 *Inside rearview mirrors.*

S3.1.1 *Size.* The rearview mirror shall have a horizontal dimension which will provide the driver a view to the rear of the vehicle with a horizontal angle of no less than 20 degrees. The vertical angle shall be at least sufficient to provide a view of the road surface from a point not greater than 200 feet to the rear of the vehicle, to the horizon under conditions of a level road and with the vehicle occupied by the driver and four passengers in the case of sedans, carryalls, and station wagons or loaded to gross vehicle weight in the case of buses and light trucks where inside mirrors may be applicable.

S3.1.2 *Location.* The rearview mirror shall be designed and constructed to be mounted on the inside of the vehicle in such a manner as to provide the driver with a stable, readily distinguishable image under normal road conditions. The mirror shall be located as far forward along the longitudinal axis of the vehicle as the windshield, mount, and adjusting device will permit (buses excepted). The mirror and its supporting brackets shall be located above the forward horizontal line of sight, if possible, of a manikin which measures 33 inches from the "H" point to the top of the head and occupying the driver's seat set in the mid position, with due regard being given to the requirements of the vertical field of view to the rear (see S3.1.1). Extra large bus mirrors designed to serve an additional purpose of passenger surveillance shall be located with due consideration of the preceding requirements.

S3.1.3 *Mounting.* The mirror shall be mounted in the vehicle by means of a suitable supporting assembly of sufficient strength to provide a stable support for the mirror and shall be of a design which will minimize injury potential to occupants. The mount, if in the impact area, shall be designed to break away or collapse upon the application of a force in excess of 90 pounds, in the direction applied by the head of a belted occupant. The head impact area shall be established through the use of type 1 seat belt assembly restrained manikins or other test devices having "H" point to top-of-head dimensions of 33 inches and 29 inches. Adjustable seats shall be in the extreme forward position for the indicated 33 inch device and in the extreme rearward position for the indicated 29 inch device. The impact area shall be that included between the arcs formed by the top-of-head point when each device is swung forward and also 45 degrees to each side of the longitudinal axis through each normal seating position. Rigid mounts shall break in such a manner as to leave no protruding residuals. The rim of the mirror or its supporting bezel shall have an edge radius of not less than 0.125 inch. The mount shall provide for universal adjustment of the mirror to accommodate any size driver in any available seat position.

S3.2 *Outside mirrors.*

S3.2.1 *Size.* The outside mirror reflecting surface shall have a minimum nominal diameter of 5 inches if of circular design. Rectangular mirrors shall have a minimum nominal horizontal dimension of 5 inches and a vertical dimension sufficient to provide the driver a view of the road surface from a distance of not more than 35 feet to the rear from the eye of the driver of the vehicle and to the horizon on a level road under normal load conditions. The 35 feet shall be measured from the position of the eye of the driver to the reflecting surface, then to the roadway to the rear of the vehicle.

S3.2.2 *Mounting.* The outside rearview mirror shall be designed and constructed to be mounted on the left outside of the vehicle in such a manner as to provide the driver with a stable, readily distinguishable image under normal road conditions and shall be so located as to require not more than 60 degrees combined head and eye movement with driver's seat in forward position. The outside mirror shall provide the operator, with seat in full forward position, a view of the side of the vehicle on which mounted. The mirror shall not be obscured by the unwiped portion of the windshield or by the corner pillar. The mirror shall be readily adjustable to accommodate different size drivers, seat positions, and load conditions. The mirror and mount shall be designed, constructed, located, and mounted so as to minimize pedestrian injury potential.

S3.2.3 *Additional outside rearview mirror.* Station wagons, carryalls, buses, and trucks shall be provided with an additional outside rearview mirror to provide driver vision to the right rear areas adjacent to the vehicle obscured by vehicle design or load conditions. The visual characteristics of the right outside mirror shall conform to the requirements of the left outside mirror except that the restriction on combined head and eye movement may be relaxed to the extent dictated by vehicle design. Design, construction, location, and mounting of the right outside mirror shall be symmetrical to the left outside mirror except that where necessary, consideration may be given to location and mounting problems dictated by vehicle design.

S3.2.4 *Wide angle mirror.* When specified, an auxiliary wide angle (convex) mirror may be incorporated in the same mount as the standard mirror to provide an additional close-in field of vision required under certain operating conditions. The auxiliary mirror shall be incorporated in such a manner as not to interfere with the visual field of the standard mirror.

S3.3 *Mirror construction.* The reflective medium shall be of a material which will resist abrasion and erosion incident to accepted cleaning practices. The surfaces of the material shall be so finished as to provide and maintain a distortion free reflected image. Front or second surface reflectance may be used. The reflectance value of the reflective film employed shall be not less than 50 percent. Inside mirrors may be of the selective position prismatic type, in which case the reflectance value in the night driving, high-glare position shall be not less than 4 percent.

[Federal Standard No. 515/18]

WINDOW AND DOOR CONTROLS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes the requirements for the location and construction of the controls for windows and doors.

S2. *Application.* This standard applies to sedans, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W.

S3. *Requirements.* Injury potential shall be minimized by constructing, locating or mounting of the controls in such a manner as to reduce the likelihood of injury to the head, torso and legs of lap belted occupants of rear and front seats. The occupant protection area shall be established through the use of type 1 seat belt assembly restrained manikins or other test devices based upon the equivalent to "H" point to top-of-head dimensions of 33 inches and 29 inches. The occupant protection area shall be that included between the arcs formed by the top-of-head point and torso when each device is swung forward and also 90 degrees to each side of the longitudinal axis through each normal seating position and the forward movement of the knees and legs of outside occupants.

S3.1 The controls shall be located within reach of the seat belted occupant nearest the door. Controls located away from or shielded from the impact area or recessed within the panel or armrest in such a manner to reasonably minimize the likelihood of contact by lap belted occupants shall be considered to provide an acceptable degree of protection.

S3.2 Door handle controls not meeting S3.1 shall be constructed so that they have a contact area of not less than 2 square inches substantially vertical, with minimum radii of 0.125 inch. Window control knobs not meeting S3.1 shall have a minimum contact area of not less than 1 square inch, with minimum edges radii of 0.125 inch. All controls shall have a maximum extension from the panel of 1 inch.

S3.3 Controls not meeting S3.1 or S3.2 shall be constructed of material which will deflect within 0.375 inch of the panel or detach by a force of 90 pounds leaving no residual protrusions beyond the panel surface on which mounted.

[Federal Standard No. 515/19]

ASH TRAYS AND LIGHTERS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes the location and construction of ash trays and lighters when installed in automotive vehicles to afford a reasonable degree of protection for front and rear seated occupants wearing type 1 seat belt assemblies.

S2. *Application.* This standard applies to sedans, carryalls, and station wagons.

S3. *Requirements.* Injury potential shall be minimized by locating, constructing, or mounting ash trays and lighters in such a manner as to minimize the likelihood of injury to an occupant's head, torso, or leg upon impact. The impact area for both front and rear seats shall be established through the use of type 1 seat belt assembly restrained manikins or other test devices having the equivalent to "H" point to top-of-head dimensions of 33 inches and 29 inches. The impact area shall be that included between the arcs formed by the top-of-head point and torso when each device is swung forward and also 90 degrees to each side of the longitudinal axis through each normal seating position and the forward movement of the knees and legs of outside occupants. This area to be determined with front seat in all normal positions.

S3.1 Ash trays and lighters located away from or shielded from the impact area or recessed within the panel or armrest in such a manner to minimize the likelihood of contact of the head, torso or leg of lap belted occupants shall be considered to provide a reasonable degree of protection.

S3.2 Ash trays not meeting S3.1 shall have a contact area of not less than 2.0 square inches with a minimum edge radius of 0.125 inch. Lighters not meeting S3.1 shall have a contact area of not less than 1.0 square inch with a minimum edge radius of 0.125 inch and maximum extension from the panel of not more than 1 inch.

S3.3 Ash trays and lighters not meeting S3.1 or S3.2 may be constructed of material which will either deflect flush within not more than 0.375 inch of the panel or be pushed flush with the surface or detach from its mounting by the application of a force not to exceed 60 pounds.

[Federal Standard No. 515/20]

ARMRESTS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for armrests when installed in automotive vehicles to afford a reasonable degree of protection for front and rear seated occupants wearing type 1 seat belt assemblies.

S2. *Application.* This standard applies to sedans, carryalls, station wagons, and light trucks up to 10,000 pounds G.V.W.

S3. *Requirements.* Injury potential shall be minimized by constructing and mounting the arm rests in such a manner as to minimize or spread the area of contact of the body with any rigid elements of the arm rests. Occupant protection area for both lateral and longitudinal impact shall be determined by the use of a type 1 lap belt restrained three dimensional 95th percentile male manikin or other equivalent test device for both rear and front seats with the front seat in all normal positions.

S3.1 The inside exposed surface of the arm rests shall be substantially vertical. In any normal position of the seat, the substantially vertical surface of the arm rest shall provide an area of broad contact with the pelvic region of not less than 2.0 inches vertically. The top and sides of the arm rests shall be covered with energy absorbing material, if not constructed of such materials. The arm rests shall not have any sharp, narrow, or protruding rigid edges in the contact area exposed or under the energy absorbing material. The top and sides of the mounting bracket shall not have any rigid edges of less than 0.750 inch radius.

S3.2 Arm rests not meeting S3.1 shall be constructed of flexible material which will deflect toward the panel and provide a resultant contact area of the pelvic region of no less than that specified in the preceding.

S3.3 Accessories or equipment attached to the arm rests shall meet the safety requirements applicable to such equipment or accessories and shall not nullify the injury reducing intent of any of the preceding.

[Federal Standard No. 515/21]

PADDING FOR AUTOMOTIVE SEAT BACKS

S1. *Purpose and scope.* This standard establishes requirements for seat back frames to be so constructed as to absorb and dissipate energy imparted to top and back by the upper torso, limbs, and head of forward facing passengers restrained by type 1 seat belts seated in rear thereof in the event of collision.

S2. *Application.* This standard applies to sedans, school buses, carryalls, station wagons, and to light trucks up to 10,000 pounds gross vehicle weight with provisions for forward facing passenger seating within the cab in rear of the front seat. The guardrail behind the driver's seat in school buses shall be considered as a seat back frame for the purpose of this standard.

S3. *Requirements.*

S3.1 The top and back of the front seats in sedans, the top of the back of forward facing seats, except the rear-most seat, in carryalls and station wagons, the top and backs of all forward facing seats in school buses, except the driver's seat and the rear-most seats, and the guardrail behind the driver's seat in school buses, shall be so constructed and padded with slow return impact absorbing material as to limit the force buildup on that portion of the human body coming in contact therewith, to a maximum of 80 gs in 60 milliseconds at an impact velocity rate of 22 feet per second, excluding the first 3 milliseconds of the time curve.

S3.2 The specific areas to be padded shall be determined by the use of type 1 seat belt assembly restrained manikins or other test devices having "H" point to top-of-head dimensions of 33 inches and 29 inches. These manikins shall be swung through a vertical arc simulating the lap-belted occupant in each seating position, with the front seat in the rear-most position. They shall also be swung through a 45 degree angle to each side of the longitudinal axis of the vehicle. The arc plane so described shall establish the seat top and back areas under consideration in this standard. The headrest shall be considered if applicable. Seat spacing in school buses shall be established at 28 inches for test purposes.

[Federal Standard No. 515/22]

HEADRESTS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes the requirements for front seat headrests in passenger carrying vehicles to afford a reasonable degree of protection from neck injuries (whiplash) in the event of a rear-end collision.

S2. *Application.* This standard applies to sedans and station wagons. (Outside seating positions of front seats.)

S3. *Standard characteristics.* The Society of Automotive Engineers Inc., Manikins For Use in Defining Vehicle Seating Accommodations, SAE J826, forms a basis in part for this Federal Standard.

S3.1 *Definition.*

S3.1.1 *Headrest.* A well padded area provided for head support.

S3.2 *General.* The headrest may be designed as an extension of the seat back or an attachment to the seat back. The headrest may or may not provide for transversely adjustable mounting. If a transversely adjustable mounting is not provided, the width specifications in S3.3.1 shall apply.

S3.3 *Requirements.*

S3.3.1 The minimum width of the headrest shall be 10 inches and the average width

shall be at least 12 inches, both based on the forward facing surface that can be contacted by the head of the occupant. The top of the headrest shall be at least 25 inches above the "H" point of the three dimensional manikin (SAE J826).

S3.3.2 The headrest, including any supporting structure that can be contacted by the head of an occupant of the vehicle, shall be constructed of or covered with a material of impact-absorbing qualities on all outer surfaces.

S3.3.3 Structural deflection of the headrest resulting from contact in rear-end collisions is allowable, except that rebound action shall be minimized. The headrest and its supporting structure shall have sufficient strength to withstand a force no less than 200 pounds in either fore or aft direction without structural failure, although a limited amount of permanent distortion is permissible.

[Federal Standard No. 515/23]

SIDE MARKER DEVICES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for side marker systems to assure notice and recognition of vehicles from lateral positions during darkness and inclement weather.

S2. *Application.* This standard applies to sedans, carryalls, and station wagons

S3. *Requirements.* The side marker systems shall consist of either an independent electrical system or an electrical system, in combination with or utilizing head and/or tail lamps, or a reflective system, or a combination of both electrical and reflective systems. The side marker device housings or mounting plates shall be antirust material, or sufficiently plated or finish coated to be noncorrosive. As applicable, these requirements shall conform to the Uniform Vehicle Code, Chapter 12. The lateral included angles of visibility of the side markers shall be from the lateral angle toward the front of the vehicle when head lamps are no longer visible, to the lateral angle toward the rear of the vehicle when tail lamps become visible.

S3.1 *Electrical side marker devices.* The electrical side marker system shall be securely mounted. The system lamps shall be a minimum of one at or near the front and one at or near the rear edges on each side of the vehicle. The mounting height shall be not less than 16 inches measured from the center of such lamp to the level ground upon which the vehicle stands without a load. The electric side marker lamp colors shall be white to amber for the front and red for the rear and they shall be steady burning simultaneously with the head and tail lamps and parking lamps. The electric lamps shall be capable of being distinguished under normal atmospheric conditions and at the time lights are required to provide recognition at all distances between 500 and 50 feet from the lateral sides of the vehicle. Minimum photometric candlepower shall be in accordance with table 1, SAE Standard J592.

S3.2 *Reflective side marker devices.* The reflective side marker devices shall be securely mounted two on each side, one at or near the front and one at or near the rear edge of the fenders or body of the vehicle, as applicable. The reflective devices shall be mounted at a minimum height of 16 inches measured from the center of the device to the level ground upon which the vehicle stands without load. Reflective devices shall be of such size and have such characteristics as to be readily visible at night time from all distances and at the lateral angles specified within 600 feet to 100 feet from the vehicle when illuminated by the beams of head lamps of the observer's vehicle. Minimum candlepower reflectance measurement shall be in accordance with class A, SAE Standard J594c.

S3.2.1 *Reflective device colors.* The color of the reflective devices shall be white to amber for the front and red for the rear of the vehicle.

S3.3 *Electrical and reflective side marker devices.* The electrical and reflective type side marker device, when combined, shall conform to the preceding paragraphs.

[Federal Standard No. 515/24]

REAR WINDOW DEFOGGER FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for rear window defogging, designed to achieve the most practical vision through the rear window.

S2. *Application.* This standard applies to sedans.

S3. *Requirements.* The rear window defogger system shall be permanently installed, to provide for the removal of fog from inside the rear window caused by atmospheric conditions and passenger loading conditions, in the vehicle. The system shall be of a capacity to clear a minimum area of 75 percent of the operators viewed area of the rear window as reflected in the rear view mirror.

S3.1 *Testing.* The defogger system shall remove fogging under any atmospheric condition and with full passenger loading within a 10-minute period.

[Federal Standard No. 515/25]

ROLL BARS FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements and test procedures for roll bars installed on specific automotive vehicles to afford a reasonable degree of occupant protection in a rollover.

S2. *Application.* This standard applies to light trucks up to 10,000 pounds G.V.W. of the utility type with open bodies, and those with enclosures made of canvas, metal, fiber glass, or plastic.

S3. *Requirements.* The roll bar shall be designed for each manufacturer's product to establish the width, height, clearances, and proper strengths of the structural members required. The roll bar shall be constructed to guard the operator and passenger compartment, or compartments, within a rigidly attached structural bar unit assembly. The strength and size shall be as required for each vehicle type and weight with the specified number of occupants for which the vehicle is designed to be used and for their maximum protection without critical deformation or critical encroachment on the operator or passenger compartments. To the extent practical, the roll bar structure shall be located to preclude contact by the heads of belted occupants. If this is not possible, the roll bars shall be covered with energy absorbing cushioning material. The roll bar structure designs shall not impair the vehicle operator's vision or body movements while operating the vehicle. Unless otherwise specified, vehicle manufacturers may eliminate a fold down windshield on the utility truck and incorporate a new designed fixed windshield strengthened to become part of a roll bar structure.

S3.1 *Testing.* The testing requirements for the area of critical encroachment shall be measured from the "H" point of a manikin with "H" point to top-of-head dimension of 33 inches. Performance requires a manikin, seat belt restrained, for each passenger and operator position in the vehicle and with the vehicle tested to the SAE Recommended Practice of SAE J857. For the hill rollover test, specific speed of 50 miles per hour shall be used.

[Federal Standard No. 515/26]

FUEL TANKS AND TANK FILLER PIPES FOR AUTOMOTIVE VEHICLES

S1. *Purpose and scope.* This standard establishes requirements for the integrity and security of fuel tanks and tank filler pipes for automotive vehicles.

S2. *Application.* This standard applies to sedans, buses, station wagons, carryalls, and light trucks up to 10,000 pounds G.V.W. Excluded are utility vehicles of the three-wheel type.

S3. *Standard characteristics.* The SAE Recommended Practice for Barrier Collision Tests, SAE J850 forms the basis for section S3.1 of this standard as modified in S3.1.1.

S3.1 Fuel tanks and tank filler pipes shall be constructed so that they will not rupture, be totally displaced from installed positions, or discharge fuel from the filler pipe, under any condition of tank capacity loading, when subjected to longitudinal and/or lateral acceleration/deceleration forces developed at their installed position, during the SAE J850 barrier collision test at 30 miles per hour.

S3.1.1 Other testing methods, such as high capacity acceleration facilities, giving equivalent results, may be utilized in lieu of the SAE J850 barrier collision test.

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